

15. (Currently amended) The method for Claim 12, [characterized in that] wherein the [semiconductor layers] n-type compound semiconductor layer and the p-type semiconductor layer are made of Group III-V nitride semiconductors.

16. (Currently amended) An optical disk apparatus [characterized by] comprising:
a light-emitter including [a] the semiconductor laser device of claim 1;
a condensing optical system that condenses laser light emitted from the light-emitter on a storage medium on which data has been recorded; and
a photodetector that detects part of the laser light that has been reflected from the storage medium[,
the laser device being characterized by including:
a resonant cavity made up of a plurality of semiconductor layers; and
a reflective film, which contains niobium oxide and is formed on an end facet of the resonant cavity].

REMARKS

I. Introduction

In response to the pending Office Action, Applicants have amended the specification so as to correct an inadvertent typographical error in the specification. In addition, claims 1, 3-5, 7, 8, 11-13, 15 and 16 have been amended so as to address the rejection set forth under 35 U.S.C. § 112, second paragraph, as well as to further distinguish the present invention over the cited prior art. Support for the amendments to the claims can be found, for example, in Fig. 1 and the corresponding portion of the disclosure.

For the following reasons, Applicants respectfully submit that all pending claims are patentable over the cited prior art references.

II. The Rejection Of The Claims Under 35 U.S.C. § 112

Claims 1-16 were rejected under 35 U.S.C. § 112, second paragraph, for failing to recite enough structural elements (or steps) to support a laser. It is respectfully submitted that, as amended, the pending claims clearly recite adequate structure for conveying to one of skill in the art the scope and bounds of the semiconductor laser device of the present invention. Nothing more is required. Indeed, it is well known that "[i]f one skilled in the art would understand the bounds of the claim when read in light of the specification, then the claim satisfies section 112, paragraph 2". *Exxon Research & Engineering Co. vs. United States*, 265 F.3rd 1371 (Fed. Cir. 2001). Claims do not need to be blueprints for constructing the claimed device.

Accordingly, for the foregoing reasons, it is respectfully submitted that the pending claims are in compliance with the requirements of 35 U.S.C. § 112, second paragraph.

III. The Rejection Of Claims 1-15 Under 35 U.S.C. § 102

Claims 1-15 were rejected under 35 U.S.C. § 102 as being anticipated by USP No. 6,285,702 to Caprara. For the reasons set forth below, it is respectfully submitted that claims 1-15, as amended, are not anticipated by Caprara.

As recited by amended claim 1, the present invention relates to a semiconductor laser device comprising a resonant cavity (12) disposed between an n-type compound semiconductor layer and a p-type compound semiconductor layer, in which a light is emitted along the interfaces of each semiconductor layer. The laser device further includes a reflective film (13),

which is composed of a first dielectric layer (13a) and a second dielectric layer (13b) containing niobium oxide, adhered to an end facet of the resonant cavity.

Turning to the cited prior art, Caprara discloses an OPS (optically-pumped semiconductor) laser device which includes an OPS structure 32 composed of a surface-emitting gain-structure 34 formed by depositing a plurality of semiconductor layers, and a mirror-structure 30 adhered to the gain-structure 34.

Caprara also discloses the use of enhanced metal-mirrors including Nb_2O_5 (high refractive index layer) and SiO_2 (low refractive index layer) as the OPS structure. Specifically, Caprara discloses that in the case where the wavelength is 700nm or less, instead of semiconductor material, the reflective film should be made of a dielectric material such as titanium oxide, niobium oxide and silicon dioxide. (*See*, col. 23, line 64 - col. 24, line 10).

However, as disclosed by Caprara (*see*, col. 7, lines 14-17), the pump-light 42 is focused on the surface of the gain-structure 34 and reflected by the mirror-structure 30 provided on the back of the gain-structure 34, and thereafter emitted from the surface of the gain-structure 34 as a laser beam. ***Thus, in contrast to the present invention, at a minimum, Caprara fails to disclose a resonant cavity from which a light is emitted along the interfaces of the semiconductor layers, which the resonant cavity is disposed between, by applying a voltage to the gain-structure 34.***

Accordingly, as anticipation under 35 U.S.C. § 102 requires that each element of the claim in issue be found, either expressly described or under principles of inherency, in a single prior art reference, *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 218 USPQ 781 (Fed. Cir. 1983), for the foregoing reasons, it is clear that Caprara does not anticipate amended claim 1.

Claim 12, which is a method claim corresponding to claim 1, recites in-part sequentially depositing an n-type compound semiconductor layer, a resonant cavity, and a p-type compound semiconductor layer. As discussed above, Caprara does not disclose a resonant cavity disposed between an n-type compound semiconductor layer and a p-type compound semiconductor layer, and therefore, at a minimum also fails to disclose the foregoing limitation recited by claim 12. Thus, it is respectfully submitted that claim 12, as amended, is not anticipated by Caprara.

IV. All Dependent Claims Are Allowable Because The Independent Claims From Which They Depend Are Allowable

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claims 1 and 12 are patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

V. The Rejection Of Claim 16 Under 35 U.S.C. § 103

Claim 16 was rejected under 35 U.S.C. § 103 as being obvious over USP No. 6,285,702 to Caprara in view of USP No. 5,872,759 to Yamanaka. For the reasons set forth below, it is respectfully submitted that claim 16, as amended, is patentable Caprara and Yamanaka, taken alone or in combination with one another.

As set forth in the pending rejection, Yamanaka is relied upon as disclosing an optical disk apparatus. Yamanaka is not relied upon as disclosing the claimed resonant cavity and reflective film as recited by claim 16, nor does Yamanaka appear to do so. Accordingly,

Yamanaka does not cure the deficiencies of Caprara noted above with regard to claim 1. As such, it is respectfully submitted that even assuming *arguendo* that the combination of Caprara and Yamanaka is proper, the combination still fails to disclose or suggest each and every limitations recited by claim 16, and therefore the combination does not present a *prima facie* case of obviousness.

For the foregoing reasons, it is respectfully submitted that claim 16 is patentable over Caprara ad Yamanaka.

VI. Request For Notice Of Allowance

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited.

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

Attached hereto is a clean version of the claims and specification by the current amendment. The attached page is captioned "**APPENDIX.**"

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-0417.

Respectfully submitted,

McDERMOTT, WILL & EMERY

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6/13/03

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APPENDIX

IN THE SPECIFICATION:

The third full paragraph on page 21 have been amended to read as follows:

--In addition, a Group III-V nitride semiconductor, containing gallium nitride as a main component, is used a semiconductor material for the violet-light-emitting semiconductor laser device with an oscillation wavelength of about 400nm. Alternatively, any Group II-VI compound semiconductors such as zinc selenide (ZnSe), zinc sulfide (ZnS) and zinc oxide(ZnO) may also be used.--

IN THE CLAIMS:

Claims 1, 3-5, 7, 8, 12, 13, 15 and 16 to read as follows.

1. (Currently amended) A semiconductor laser device comprising:

a resonant cavity disposed between a n-type compound semiconductor layer and a p-type compound semiconductor layer at the main surface and the opposite surface, a light is emitted along the interfaces of the n-type compound semiconductor layer and the p-type compound semiconductor layer by applying a voltage to each compound semiconductor layer; and
a reflective film adhered to an end facet of the resonant cavity,
wherein the reflective film is composed of a first dielectric layer and a second dielectric layer containing niobium oxide.

3. (Currently amended) The semiconductor laser device of Claim 1, wherein the n-type compound semiconductor layer and the p-type semiconductor layer are made of Group III - V nitride semiconductors.

4. (Currently amended) The semiconductor laser device of Claim 1, wherein a refractive index of the second dielectric layer is greater than a refractive index of the first dielectric layer.

5. (Currently amended) The semiconductor laser device of Claim 1, wherein the first dielectric layer is made of silicon dioxide or aluminum oxide.

7. (Currently amended) The semiconductor laser device of Claim 4 wherein the n-type compound semiconductor layer and the p-type semiconductor layer are made of Group III - V nitride semiconductors.

8. (Currently amended) The semiconductor laser device of claim 1, wherein the reflective film is formed by alternately laminating a plurality of first dielectric layers and a plurality of second dielectric layers containing niobium oxide.

12. (Currently amended) A method for fabricating a semiconductor laser device, said method comprising the steps of:

sequentially depositing a n-type compound semiconductor layer, a resonant cavity, and a p-type compound semiconductor layer on a substrate;

exposing an end facet of a resonant cavity in an emitting direction by cleaving or etching the; and

forming a reflective film composed of a first dielectric layer and a second dielectric layer containing niobium oxide on the exposed end facet of the resonant cavity.

13. (Currently amended) The method of Claim 12, wherein the step of forming the reflective film includes the step of alternately depositing a plurality of first dielectric layers and a plurality of second dielectric layers containing niobium oxide.

15. (Currently amended) The method for Claim 12, wherein the n-type compound semiconductor layer and the p-type semiconductor layer are made of Group III-V nitride semiconductors.

16. (Currently amended) An optical disk apparatus comprising:
a light-emitter including the semiconductor laser device of claim 1;
a condensing optical system that condenses laser light emitted from the light-emitter on a storage medium on which data has been recorded; and
a photodetector that detects part of the laser light that has been reflected from the storage medium.